STATEMENT OF THE CLAIMS

1. (currently amended) A method for equalizing a multicarrier wireless telecommunications data signal ~~carried by at least three carriers~~, comprising:

a) receiving the multicarrier wireless telecommunications data signal ~~carried by at least three carriers~~ without accompanying pilot signals;

b) extracting per-carrier phase and amplitude adjustment information from the multicarrier wireless telecommunications data signal by reducing and averaging differential quadrature components of said multicarrier wireless telecommunications data signal;

c) processing said per-carrier phase and amplitude adjustment information in order to obtain equalization indications; and

d) equalizing said multicarrier wireless telecommunications data signal by modifying indications of said wireless telecommunications data signal using said equalization indications.

2. (canceled)

3. (canceled)

4. (currently amended) A method according to claim ~~3~~ 1, wherein:

said indications of said wireless telecommunications signal are Fourier transformed indications (X_{kR}, Y_{kR}),

said equalization indications are equalization vectors ($X_{kT}(i)$, $dY_{kT}(i)$) where i is an index of equalization steps, and

said modifying indications of said wireless telecommunications signal comprises correcting said Fourier transformed indication with said estimates of equalization vectors to obtain corrected Fourier transformed indications X_{ke} and Y_{ke} for k=1,2,…K where K is the number of carriers of said multicarrier signal ~~and is at least three~~.

5. (original) A method according to claim 4, wherein:

said equalization vectors are obtained by calculating differences between said corrected Fourier transformed indications X_{ke} and Y_{ke} and closest constellation point values to provide differential quadrature components of the corrected received signal dX_k and dY_k, reducing said differential quadrature components to obtain reduced differential components dX_{red}, dY_{red}, averaging sequences of said reduced differential components to provide estimates of the differential quadrature components of the reference signal for the k-th carrier dX_{rk} and dY_{rk}, and using said estimates of the differential quadrature components to obtain said equalization vectors.

6. (original) A method according to claim 5, wherein:

said reducing is accomplished according to

$$dX_{red} = (A_0/a_k)(dX_k\cos\Delta_k - dY_k\sin\Delta_k),$$

$$dY_{red} = (A_0/a_k)(dY_k\cos\Delta_k + dX_i\sin\Delta_k),$$

where dX_{red} and dY_{red} are reduced differential quadrature components of the k-th carrier, A_0 is an amplitude of a reference vector, a_k is an amplitude of a decision vector for a k-th carrier, and Δ_k is a phase difference between a decision vector and a reference vector for the k-th carrier.

7. (original) A method according to claim 6, wherein:

said averaging is accomplished according to

$$dX_{rk} = (1/N)\sum dX_{kred}(j)=(A_0/N)\sum_{j=1}^{N} (dX_k(j)\cos D_k(j) - dY_k(j)\sin D_k(j))/a_k(j),$$

$$dY_{rk} = (1/N)\sum dY_{kred}(j)=(A_0/N)\sum_{j=1}^{N} (dY_k(j)\cos D_k(j) + dX_k(j)\sin D_k(j))/a_k(j)$$

where dX_{rk} and dY_{rk} are averaged estimated differential quadrature components for the k-th carrier, $dX_k(j)$ and $dY_k(j)$ are differential quadrature components of the k-th carrier at the j-th symbol, $D_k(j)$ is the phase difference between the decision and reference vectors for the k-th carrier at the j-th symbol, $a_k(j)$ is the amplitude of the decision vector of the k-th carrier at the j-th symbol, and N is the number of symbols being averaged.

8. (original) A method according to claim 7, wherein:

said using said estimates of the differential quadrature components to obtain said equalization vectors is accomplished according to

$$X_{kT}(i) = R_k(X_{kT}(i-1) + dX_{rk}X_{kT}(i-1) + dY_{rk}Y_{kT}(i-1)),$$

$$Y_{kT}(i) = R_k(Y_{kT}(i-1) + dX_{rk}Y_{kT}(i-1) - dY_{rk}X_{kT}(i-1)),$$

where $X_{kT}(i)$ and $Y_{kT}(i)$ are said estimates of equalization vectors for the k-th carrier at a current i-th step of adaptation, $X_{kT}(i-1)$ and $Y_{kT}(i-1)$ are estimates of the equalization vector for the k-th carrier at a previous (i-1)-th step of adaptation, and $R_k = 1/((1+dX_{rk})^2 + dY_{rk}^2)$.

9. (original) A method according to claim 8, wherein:

said reference vector is (1,0).

10. (original) A method according to claim 8, wherein:

said modifying is accomplished according to

$$X_{ke} = X_{kT}*X_{kR} - Y_{kT}*Y_{kR},$$

$$Y_{ke} = X_{kT}*Y_{kR} + Y_{kT}*X_{kR}.$$

11. (original) A method according to claim 4, wherein:

said modifying is accomplished according to

$$X_{ke} = X_{kT}*X_{kR} - Y_{kT}*Y_{kR},$$

$$Y_{ke} = X_{kT}*Y_{kR} + Y_{kT}*X_{kR}.$$

12. (currently amended) A telecommunications apparatus, comprising:

a receiver which receives a multicarrier wireless telecommunications data signal ~~having at least three carriers~~ without accompanying pilot signals, said receiver including an equalizer, said equalizer including means for extracting per-carrier phase and amplitude adjustment information from the multicarrier wireless telecommunications data signal by reducing and averaging differential quadrature components of the received multicarrier wireless telecommunications data signal, for processing said per-carrier phase and amplitude adjustment information in order to obtain equalization indications, and for equalizing said multicarrier wireless telecommunications data signal by modifying indications of said wireless telecommunications data signal using said equalization indications.

13. (canceled)

14. (canceled)

15. (currently amended) A telecommunications system, comprising:

a first telecommunications apparatus including a transmitter which transmits a wireless telecommunications data signal ~~having at least three carriers~~ without accompanying pilot signals; and

a second telecommunications apparatus including a receiver which receives said wireless telecommunications data signal, said receiver including an equalizer, said equalizer including means for extracting per-carrier phase and amplitude adjustment information from the multicarrier wireless telecommunications data signal by reducing and averaging differential quadrature components of the received multicarrier wireless telecommunications data signal, for processing said per-carrier phase and amplitude adjustment information in order to obtain equalization indications, and for equalizing said multicarrier wireless telecommunications data signal by modifying indications of said wireless telecommunications data signal using said equalization indications.